ble that on the gland cell passing into the condition of activity an increased production of CO_2 may occur, leading to an increased diffusion of water outwards.

So far, I have quoted Professor Hedenhain, for the most part in his own words. Let me add, however, that the two hypotheses which he advances as possible explanations of the mechanism of secretion of water by the cell rest upon the most probable grounds, as upon the presence of the intra-cellular protoplasmic network which has been so beautifully demonstrated by recent researches, and especially by those of Professor Klein; or, again, upon the fact, proved by the analyses of Professor Pflüger of the gases of the saliva, that there is during secretion great production of CO_2, as shown by the amount of this gas in the saliva being much greater than in the blood, and upon the fact of the remarkable diffu ibility of acid solutions.

Reasoning upon a large number of facts, which I have not time to refer to, Professor Heidenhain has come to the conclusion that, quite apart from the nerves which control the vascular supply to a gland, there exist two distinct sets of nerve-fibres in relation to the glandular elements. The first of these, which he terms "secretory," when stimulated, lead to the secretion of water and saline constituents; the second, which he terms "trophic," influence the transformations of the protoplasm of the cell, and thus affect the organic constituents of the secretion.

I do not wish to pronounce a definite opinion concerning this hypothesis, but would remark that the nomenclature proposed by Heidenhain appears to me to be an unfortunate one, especially because it attaches a new meaning to a word which had previously been used by physiologists in a different sense. I refer to the adjective *trophic*, which has always implied "governing nutrition." It appears to me almost inconceivable that if there exist two sets of secretory nerves, the action of each should not profoundly affect the nutrition of the cell protoplasm, though, of course, it is conceivable that they should do so in very different manners.

General Conclusions.

The complicated studies, of which I have attempted to give you a brief sketch, have led to our forming certain clear general conceptions in reference to the process of secretion. They have brought into greater prominence the dignity, if I may use the expression, of the individual cell. The process of secretion appears as the result of the combined work of a large number of these units. Each, after the manner of an independent organism, uses oxygen, forms CO_2, evolves heat, and derives its nutriment from the medium in which it lives, and performs chemical operations of which the results only are imperfectly known to us, and which depend upon peculiar endowments of the cell protoplasm, of which the causes are hidden from us. So long as the protoplasm is living, the gland cell retains its power of discharging its functions, and in many cases does so, so long as the intercellular liquid furnishes it with the materials required. In some cases, however, the gland cells are specially sensitive to a variation in the composition of the nutrient liquid, certain constituents of which appear to stimulate the protoplasm to increased activity. In the higher animals the cells, particularly in certain glands, are in relation to nerves which, when stimulated, affect in a remarkable manner the transformations of their protoplasm, leading to an increased consumption of oxygen, an increased production of carbonic acid, an increased evolution of heat, and an increased production of those matters which the cell eliminates and which constitute its secretion.

This historical survey of the growth of our knowledge of the process of secretion exhibits the characteristic features of biological advancement. Comparative anatomy has been the foundation of observation of facts and physical experiment, the road to physiological research. At various stages the value of hypotheses has been well illustrated, and, whenever they have had to make way for the broader and truer interpretations suggested by the accumulation of facts and greater precision of observation, it has been demonstrated that the process of observation is not one of simple sight but of complex ratiocination.

NOTES

A Medal and Prize, of the annual value of twenty guineas, has been founded by Dr. Siemens, F.R.S., "with the object of stimulating the students of King's College, London, to a high standard of proficiency in metallurgical science." It is open to those who have, as Matriculated Students, studied in the Applied Science Department for two years, and who, either in their third year, or, if they remain in the Department for three years, in the succeeding year, make metallurgy a special study. The first award will be made at the end of June, 1883, and will depend partly on an essay on some particular subject, partly on a written examination on the metallurgical lectures, and partly on actual work done in the Laboratory. The subject for the essay for 1883 will be the "Manufacture of Steel suitable for Ship and Boiler Plates." The essays are to be illustrated by freehand sketches and mechanical drawings to scale, and must be sent in to Prof. Huntington on or before June 30.

Sir Woodbine Parish, K.C.H. and F.R.S., died, towards the close of last week, at Quarry House, St. Leonards-on-Sea, in the 86th year of his age. Sir Woodbine was long engaged in the diplomatic service, though his name is also known in the scientific world. As far back as 1824 he had been elected a Fellow of the Royal Society, and was a member of several learned societies both at home and abroad; he had been a vice-president both of the Geological and Geographical Societies. His name is well known in the scientific world as having brought to this country the remains of the megatherium, the glyptodon, and other fossil monsters from the plains and valleys of South America, and his work on the natural history, &c., of Buenos Ayres and Rio de la Plata received a high encomium from no less an authority than Baron Humboldt.

The death is announced of Count Lutke, well known in connection with Russian Arctic exploration, especially in the Novaya Zemlya region.

The next Congress of Electricians will meet in Paris on October 11. The Members will have to deliberate, as we have already stated: (1) on the determination of the length of the mercury column equivalent to the practical ohm; (2) on the construction of lightning conductors, and influence of telegraphic or or telephonic wires on thunder-storms; (3) on the means of establishing a general system of observations for atmospheric electricity; (4) on the opportunity of using the telegraph system for establishing constant communication between a certain number of meteorological observatories. At the same time a Diplomatic Congress will meet on the protection of cables. It is surmised, moreover, that the former will be presided over by M. Cochery, Minister of Postal Telegraphy, and the latter by M. Duclerc, Minister of Foreign Affairs.

We learn from the *North China Herald* that Sir Robert Hart, the Inspector-General of the Chinese Maritime Customs, has fully granted his assistance to the project of a China coast meteorological service. Formerly a certain Minister of the Customs Officers voluntarily made observations and sent them to M. Dechevrens, the head of the Siccawei Observatory at Shanghai; but these were frequently interrupted by the observers being transferred to other ports. Sir Robert has now directed that the observations at all the ports and lighthouses be sent to Shanghai regularly. A storm warning service is also being organised in Japan under the superintendence of Mr. Knipping.

The *equatorial coudé* (bent equatorial) invented and designed by M. Lœwy, is in full operation at the Observatory of Paris. Observations are conducted with it, although the clock is not yet in place. The peculiarity is that in consequence of the bending and the use of two reflecting mirrors, the astronomer can observe all the celestial bodies without moving from his table. The reflected rays are sent to the eyepiece through the axial part of the refractor by a fixed mirror. The object-glass is placed at the end of the movable part, which revolves round the axial part

in an equatorial direction. The rays from the stars are received by a reflecting mirror movable with the object-glass and rotating at will, so that it may reflect any celestial object placed in the same R.A. circle. The two motions of the tube in declination and of the mirror in R.A. are given by special handles at the disposition of the observer.

ON Monday night there was an important installation of the Edison electric light in the "Press Department" of the Telegraph Office, St. Martin's-le-Grand, and the work thus carried out solves what have hitherto been considered some difficult problems in the question of electric lighting. The first interesting fact is that the lighting is part of a "system" supplied at a distance from the place lighted, the Edison Electric Light Company having its centre on Holborn Viaduct. The extension to the top room of the General Post Office, which was accomplished last night, is the greatest yet made from one centre, the distance from the dynamo-room of the company's office to the "Press Room" of the General Post Office being 1950 feet. The "Press Room" to which the Edison electric light has thus been supplied is a very busy part of the telegraph department (1200 persons being employed there), which occupies the whole upper floor of the western building in St. Martin's-le-Grand. The Post Office authorities have long been alive to the necessity of replacing gas by electricity, and have tried more than one so-called "system." Under the advice of Mr. Preece, the electrical engineer of the Post Office, the Edison system was attached, and last night commenced its working. The first lighting was soon after 8 o'clock, and when the gas in the Press Room was extinguished, a turn of the switch lighted up fifty-nine incandescent lamps of the well-known pear-shaped pattern, with the carbon of the shape of an elongated horse-shoe. The effect of the change was very marked. In the telegraph room the atmosphere was heavy and heated. In the room lighted by the Edison lamps an even light without any shadow was thrown all over the tables, while the atmosphere, previously heated by gas, sensibly diminished, even in the short space of about twenty minutes.

THE Italian Minister of Public Instruction has agreed to the proposal made to the Government to participate in the international scientific expedition to the Marquesas Islands, in 1883, to observe the solar eclipse which will take place in May of that year. Prof. Tacchini, director of the Astronomical Observatory of the Collegio Romano, has been entrusted with the necessary preparations, and will go to London to purchase various instruments for the study of the important phenomenon.

THE arrangements for opening the new University College of Dundee are so far forward that Mr. William Peterson, B.A. Oxford, assistant to the Professor of Humanity in the University of Edinburgh, has been elected Principal. It is expected that the College will be opened in January next.

THE Marquess of Ripon has telegraphed his acceptance of the Presidency of Yorkshire College.

THE *Bollettino* of the Italian Geographical Society, alluding to the wreck of the vessel hired by Lieut. Bove for the purpose of exploring the channels of the Archipelago of Terra del Fuoco, calls attention to the fact that it was only a ship temporarily hired, and not the vessel fitted out for the Antarctic Expedition. Lieut. Bove left Punta Arenas on April 25, and three of the members of his expedition remained behind to undertake various excursions on land.

WHILST Western Europe and Western Siberia have been complaining of a cold summer, Russia has been grumbling over very hot weather; and the remarks on this subject which the Central Physical Observatory at St. Petersburg has just published in the *Golos* (August 15) are very interesting. The temperature, noticed during July last at St. Petersburg, by thermometers in shade, were certainly above the average, but not so much as might have been supposed from the painful impression produced by the hot weather. The average diurnal temperature from July 1 to 28 was 28°·6 Cels. (17°·3 at 7 a.m.), and as high as 23°·2 during July 16 to 26. It reached its maximum, 27°·1 on July 18, the thermometer showing 32° at 1 p.m. Now, the average temperature of July, as deduced from 137 years' observations at St. Petersburg, being 17°·71, it does not differ very much from that observed in July last. It is true that such continuous hot weather as in July last occurs very seldom, but it was experienced in 1761, 1763, and 1774. In 1757, the average diurnal temperature of thirty-two consecutive days was above 20° with one single interruption, when it was but 19°·3. The maximum for July last being 32°·0, it also does not much exceed the average maximum for July, which reaches 29°, whilst there were years when it was noticed at St. Petersburg as much as 36°·1. As to such days as July 18, when the average diurnal temperature reached 27°·1, they are rare indeed, as such days have occurred only five times since 1757. On the contrary, the temperatures measured by the radiation-thermometer exposed to the sun's rays were exceedingly high if compared with those measured during the last few years. Their averages for July 1 to 28 were, 33°·4 at 7 a.m.; 44°·3 at 1 p.m.; and 17°·9 at 9 p.m.; that is, 12°·5, 7°·0, and 1°·9, respectively, higher than the averages for preceding years. There were in July last nine consecutive days when the radiation-thermometer showed more than 40° Cels. at so early an hour as 7 o'clock in the morning, reaching as much as 42°·8 on July 26; and eight days when the temperature shown by the same thermometer at 1 o'clock was more than 50°, reaching even 57°·8 on July 18. In consequence, the temperature of the surface of the earth rose as much as 23°·6 instead of 18°·7, which is the normal average; it reached even 45°·3, and the average for July 16 to 26 was as high as 41° 2. The evaporation was accordingly great, reaching an average of 2·46 millimetres per day instead of the normal average of 1·89. The average cloudiness in July was only 50 per cent. instead of 56 per cent., and on July 16 to 26 it was only 36 per cent. During these ten days an anti-cyclone was blowing through Russia, its centre being above Northern Russia, and the prevailing winds being from east and south-east. With the appearance, on July 26, of a cyclone in North-Western Europe, the temperature immediately fell, and at many places there were rain and thunder.

THE dynamo-magnetic engines which killed two young men in the Tuileries Garden on the occasion of Fête de la Jeunesse, were not fed by the Brush system as was mentioned not only by us, but also by the several Paris electrical papers. The fact is, we are informed, that during the fête of July 14, the light had been given by the Brush system, and that the magneto which had done splendid service had been replaced by others of another system, the Brush Company having declined to accept the terms proposed for the Fête de la Jeunesse. But the actual cause of the catastrophe was the nakedness of the wires used.

IN the sitting of the Paris Academy on August 21 details were given, by an observer who chanced to be on the spot, of an earthquake which was felt at Dijon on August 13. The duration of the commotion was only 1 second, a slight noise for $\frac{1}{10}$ second was heard previously. The direction of the shock was south-west to north-east. The area was only 200 metres in breadth, but it could be followed along a distance of more than 12,000 metres in length.

MR. STANFORD sends us a useful map of Lower Egypt, on the scale of 14 miles to an inch.

IN reference to our recent article on Frederic Kastner, a correspondent informs us that his father was not merely an Alsacian

composer of some merit, but a learned thinker and writer whose numerous works are largely consulted in France, and which have rendered great service to the art, history, and literature of music.

THE Report of the Chief Inspector of Mines (Mr. Couchman) to the Minister of Mines for the Colony of Victoria, for the year 1881 is both an interesting and instructive document. It appears that there were altogether 38,436 miners employed in the colony, and, of these, part were engaged in alluvial mining, and part in quartz mining. The total number of accidents was 157, by which 72 men were killed and 108 injured. Forty of the deaths and 43 of the cases of injury were caused by falls of earth or rock at the surface and underground. More than 50 per cent. of the whole were thus due to a class of accidents which claim a similar proportion of the victims in our mines at home. The remaining accidents arose from: falling down shafts, winzes, and shoots; falls of material down shafts; cage accidents; machinery in motion; explosion of lithofracteur, gunpowder, dynamite, &c.; and miscellaneous causes. After describing the nature of the principal accidents Mr. Couchman discusses at considerable length the dangers due to the use of nitro-glycerine compounds, and he quotes the remarks of Lieut.-Col. Majendie upon an accident that occurred with dynamite and blasting gelatine in the Minera lead mine near Wrexham, on March 23, 1881. He also shows that the Miners' Accident Relief Funds are in a fairly healthy condition, and he says that the balance sheets which were submitted to him "afford clear proof of the great good effected by judicious combination for the relief of distress and of the large amount of benefit distributed by these praiseworthy associations since their establishment. The whole of the details of each accident, both fatal and non-fatal, are set forth in tabulated form; and five appendices show: (A) the number of accidents that occurred in the several divisions of each district; (B) the names of persons killed, whether married or single, and the number of children left by them; (C) the prosecutions under the Regulation of Mines Statute, 1877; (D) a schedule of the amounts paid to persons injured and to the relatives of persons killed; (E) the causes of the mining accidents which occurred in the several mining districts. The Report is thus very complete in every imaginable kind of detail.

THE additions to the Zoological Society's Gardens during the past week include five Wild Boars (*Sus scrofa*), European, presented by the Count de Paris; an Egyptian Cat (*Felis chaus*) from North Africa, presented by Lieutenants Fisher and Farquhar and Mr. Basset, H.M.S. *Bacchante;* a Black Rat (*Mus rattus*), British, presented by Mr. W. E. Bryant; a Thicknee (*Œdicnemus crepitans*), British, presented by Mr. C. W. Harding; an Indian Python (*Python molurus*) from India, presented by Capt. Laws; two Blue-faced Lorikeets (*Trichoglossus hæmatodes*) from Timor, received on approval.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, August 14.—M. Blanchard in the chair.—The following papers were read:—Note on Dr. Andries' theory of cyclones, by M. Faye. This German observer takes a similar view to M. Faye's. Cyclones, tornadoes, and *trombes* are one and the same mechanical phenomenon, and their powerful action is due to the force in upper currents. Dr. Andries furnishes experimental evidence from liquids.—On the appearance of manganese on the surface of rocks, by M. Boussingault. He found on quartz pebbles carried down by Venezuelan streams, a thin dark pellicle of bioxide of manganese. A similar coloration of granite on the Orinoco, Nile, and Congo, has been observed. The natives of the Andes say that it is only the white (colourless) rivers that produce the dark banks; they regard the black granite rocks as unhealthy (and with reason). In the Andes M. Boussingault found a spring containing a good deal of manganese, and forming deposits like those just referred to; the dark pellicle is probably due to suroxidation, in air, of the protoxide of manganesic carbonate.—Experimental researches on the mode of formation of craters of the moon, by M. Bergeron. He sends hot air through a brass tube into a melted but gradually cooling mass of Wood's Alloy. The bubbling forces the forming pellicle aside in a circular space, giving the aspect of a circus, then of a crater; ere long, the mass becoming pasty, the gas no longer clears the pellicle, but forms a cone in the middle. Some slightly different effects are had with other alloys; the sides of the cone may have a more broken-up appearance. An interruption of the current gave two concentric craters, the inner the higher (compare the lunar Copernicus, &c.).—Terms of short period in the earth's motion of rotation, by M. Rozé.—On the cure of saccharine diabetes, by M. Félizet. Bernard showed that irritation of a part of the *medulla oblongata* causes glycosuria. M. Félizet seeks to suppress irritation in the same quarter (the cause of diabetes), by the sedative action of bromide of potassium, and in fifteen cases he has thus effected a cure.—On a new process of insulation of electric wires, by M. Geoffroy. He wraps them in asbestos fibres and encloses in a lead tube. The wire may be quite volatilised without a spark being emitted. The lead shows no trace of fusion.—Discovery of a small planet at Paris Observatory, by M. Paul Henry.—Description of the Manger Præsepe in the Crab, and micrometric measures of relative positions of the principal stars composing it, by M. Wolf.—On the theory of uniform functions of a variable, by M. Mittag-Leffler.—General method for solution of problems relative to principal axes and moments of inertia; oscillation balance for estimation of moments of inertia, by M. Brassinne.—On the longitudinal vibrations of elastic bars, &c. (continued), by MM. Sébert and Hugoniot.—Hydrodynamic experiments; imitation by liquid or gaseous currents, of magnetic figures obtained with electric currents or with magnets (sixth note), by M. Decharme. *Inter alia*, water or air is forced through a tapered glass tube against a plate covered with a thin layer of minium diluted with water.—On the surface tension of some liquids in contact with carbonic acid, by M. Wroblewski. The decrease of the superficial tension of the liquids depends solely on the fact that the superficial tension of the carbonic acid with which they are compressed is extremely small.—On some arseniates neutral to litmus, by MM. Filhol and Senderens.—Fermentation of starch; presence of a vibrion in the germinating grain of maize and in the stem of this plant, by M. Marcano. This inquiry relates to *chicha*, a strongly alcoholic drink prepared by American Indians from maize. The vibrion's presence is regarded as clearing up several points hitherto obscure.—On five new parasitic protozoa, by M. Künstler. These were found in the larva of *Melolonthus* and of *Oryctes*, and in tadpoles.—Researches on the organs of flight in insects of the order of Hemiptera, by M. Moleyre. The apparatus connecting the anterior and posterior wings is here studied; M. Moleyre considers that in the sub-order Heteroptera, whose hemelytra (or anterior wings) fulfil best the *rôle* of protective sheaths, the connecting apparatus appears, with a remarkable fixity, in its most perfect form.—Pierre Breton and the binary nomenclature, by M. Crié.—On a disease of beet, by M. Prillieux. This disease, unknown in France before, and due to a *Peronospora*, has appeared at Joinville-le-Pont (Seine).—On the coal of Muaraze, in Zambesia, by M. Guyot. "Exploitation" seems impossible.

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